FCC TEST REPORT

FCC ID: 2BN8J-EW3228H

Report No.	:	SSP25020204-2E
Applicant	:	Guangzhou Qianzhen Digital Technology Co., Ltd
Product Name	:	Smart Portable Monitor
Model Name	:	EW3228H
Test Standard	:	FCC Part 15 Subpart E
Date of Issue	:	2025-03-19

Shenzhen CCUT Quality Technology Co., Ltd.
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This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen CCUT Quality Technology Co., Ltd.

Test Report Basic Information

Applicant.....:	Guangzhou Qianzhen Digital Technology Co., Ltd
Address of Applicant.....:	Four-floor unit, B5 Building, Huachuang Animation Industrial Park, No. 9 Huateng Road, Jinshan Village, Shiqi Town, Panyu District, China
Manufacturer.....:	Guangzhou Qianzhen Digital Technology Co., Ltd
Address of Manufacturer.....:	Four-floor unit, B5 Building, Huachuang Animation Industrial Park, No. 9 Huateng Road, Jinshan Village, Shiqi Town, Panyu District, China
Product Name.....:	Smart Portable Monitor
Brand Name.....:	Bulldex
Main Model.....:	EW3228H
Series Models.....:	EW3222H, EW3225H, E2225, E2425, E2725, E3222, E3225, E3222H, E3225H
Test Standard.....:	FCC Part 15 Subpart E KDB 789033 D02 v02r01 ANSI C63.4-2014 ANSI C63.10-2013
Date of Test .....:	2025-02-25 to 2025-03-14
Test Result.....:	Passed
Tested By .....:	Walker Wu (Walker Wu)
Reviewed By.....:	Lieber Ouyang (Lieber Ouyang)
Authorized Signatory.....:	Lahm Peng (Lahm Peng)

Shenzhen CCUT Quality Technology Co., Ltd. APPROVED

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Revision History

Revision	Issue Date	Description	Revised By
V1.0	2025-03-19	Initial Release	Lahm Peng

1. General Information

1.1 Product Information

Product Name:	Smart Portable Monitor
Trade Name:	Bulldex
Main Model:	EW3228H
Series Models:	EW3222H, EW3225H, E2225, E2425, E2725, E3222, E3225, E3222H, E3225H
Rated Voltage:	DC 12V⎓5A
Power Adapter:	Input: AC 100-240V 50/60Hz, Output: DC 12V⎓5A
Battery:	DC 11.1V, 14400mAh
Test Sample No:	SSP25020204-1
Hardware Version:	V1.0
Software Version:	V1.0
Note 1: The test data is gathered from a production sample, provided by the manufacturer. Note 2: The color of appearance and model name of series models listed are different from the main model, but the circuit and the electronic construction are the same, declared by the manufacturer.	

Wireless Specification	
Wireless Standard:	802.11a 802.11n(HT20/HT40) 802.11ac(VHT20/VHT40)
Operating Frequency:	802.11a/n/ac (HT/VHT20): U-NII Band 1: 5180MHz to 5240MHz, U-NII Band 4: 5745MHz to 5825MHz 802.11n/ac (HT/VHT40): U-NII Band 1: 5190MHz to 5230MHz, U-NII Band 4: 5755MHz to 5795MHz
Number of Channel:	Refer to the following channel list
Modulation:	OFDM (BPSK, QPSK, BPSK, 16QAM, 64QAM, 256QAM)
Antenna Gain:	1.03dBi
Type of Antenna:	FPCB Antenna
Type of Device:	☐ Portable Device ☒ Mobile Device ☐ Modular Device

Channel List for UNII Band 1 (5150-5250MHz)							
802.11a/n/ac (20MHz)				802.11n/ac (40MHz)		802.11ac/ax(80MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220	38	5190	--	--
40	5200	48	5240	46	5230	--	--

Channel List for UNII Band 4 (5725-5850MHz)							
802.11a/n/ac(20MHz)		802.11n/ac(40MHz)		802.11ac/ax(80MHz)		(160MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	--	--	--	--
153	5765	159	5795	--	--	--	--
157	5785	--	--	--	--	--	--
161	5805	--	--	--	--	--	--
165	5825	--	--	--	--	--	--

1.2 Test Setup Information

List of Test Modes		
Test Mode	Description	Remark
TM1	802.11a	Band 1/4
TM2	802.11n(HT20)	Band 1/4
TM3	802.11n(HT40)	Band 1/4
TM4	802.11ac(VHT20)	Band 1/4
TM5	802.11ac(VHT40)	Band 1/4
-	-	-

List and Details of Auxiliary Cable			
Description	Length (cm)	Shielded/Unshielded	With/Without Ferrite
-	-	-	-
-	-	-	-

List and Details of Auxiliary Equipment			
Description	Manufacturer	Model	Serial Number
-	-	-	-
-	-	-	-

Test Software & Power level setup of EUT	
Test Software	Power level setup
BskStarEngin	5

Note: The DUT was installed in a test fixture and this test fixture is connected to a laptop computer. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes, using the proprietary tool BskStarEngin.

1.3 Compliance Standards

Compliance Standards	
FCC Part 15 Subpart E	FEDERAL COMMUNICATIONS COMMISSION, RADIO FREQUENCY DEVICES, Unlicensed National Information Infrastructure Devices
All measurements contained in this report were conducted with all above standards	
According to standards for test methodology	
FCC Part 15 Subpart E	FEDERAL COMMUNICATIONS COMMISSION, RADIO FREQUENCY DEVICES, Unlicensed National Information Infrastructure Devices
KDB 789033 D02 v02r01	GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E
ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Maintenance of compliance is the responsibility of the manufacturer or applicant. Any modification of the product, which result is lowering the emission, should be checked to ensure compliance has been maintained.	

1.4 Test Facilities

Laboratory Name:	**Shenzhen CCUT Quality Technology Co., Ltd.** 1F, Building 35, Changxing Technology Industrial Park, Yutang Street, Guangming District, Shenzhen, Guangdong, China
CNAS Laboratory No.:	L18863
A2LA Certificate No.:	6893.01
FCC Registration No:	583813
ISED Registration No.:	CN0164
All measurement facilities used to collect the measurement data are located at 1F, Building 35, Changxing Technology Industrial Park, Yutang Street, Guangming District, Shenzhen, Guangdong, China.	

1.5 List of Measurement Instruments

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Conducted Emissions					
AMN	ROHDE&SCHWARZ	ENV216	101097	2024-08-07	2025-08-06
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	100242	2024-08-07	2025-08-06
Test Cable	N/A	Cable 5	N/A	2024-08-07	2025-08-06
EMI Test Software	FARA	EZ-EMC	EMEC-3A1+	N/A	N/A
Radiated Emissions					
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	100154	2024-08-07	2025-08-06
Spectrum Analyzer	KEYSIGHT	N9020A	MY48030972	2024-08-07	2025-08-06
Spectrum Analyzer	ROHDE&SCHWARZ	FSV40-N	101692	2024-08-07	2025-08-06
Amplifier	SCHWARZBECK	BBV 9743B	00251	2024-08-07	2025-08-06
Amplifier	HUABO	YXL0518-2.5-45	--	2024-08-07	2025-08-06
Amplifier	COM-MW	DLAN-18G-4G-02	10229104	2024-08-07	2025-08-06
Loop Antenna	DAZE	ZN30900C	21104	2024-08-03	2025-08-02
Broadband Antenna	SCHWARZBECK	VULB 9168	01320	2024-08-03	2025-08-02
Horn Antenna	SCHWARZBECK	BBHA 9120D	02553	2024-08-03	2025-08-02
Horn Antenna	COM-MW	ZLB7-18-40G-950	12221225	2024-08-03	2025-08-02
Attenuator	QUANJUDA	6dB	220731	2024-08-07	2025-08-06
Test Cable	N/A	Cable 1	N/A	2024-08-07	2025-08-06
Test Cable	N/A	Cable 2	N/A	2024-08-07	2025-08-06
Test Cable	N/A	Cable 3	N/A	2024-08-07	2025-08-06
Test Cable	N/A	Cable 4	N/A	2024-08-07	2025-08-06
Test Cable	N/A	Cable 8	N/A	2024-08-07	2025-08-06
Test Cable	N/A	Cable 9	N/A	2024-08-07	2025-08-06
EMI Test Software	FARA	EZ-EMC	FA-03A2 RE+	N/A	N/A
Conducted RF Testing					
RF Test System	MWRFTest	MW100-RFCB	220418SQS-37	2024-08-07	2025-08-06
Spectrum Analyzer	KEYSIGHT	N9020A	ATO-90521	2024-08-07	2025-08-06
RF Test Software	MWRFTest	MTS 8310	N/A	N/A	N/A
Laptop	Lenovo	ThlnkPad E15 Gen 3	SPPOZ22485	N/A	N/A
DUT Test Software	VanDyke Software	Rtwpriv	N/A	N/A	N/A

1.6 Measurement Uncertainty

Test Item	Conditions	Uncertainty
Conducted Emissions	9kHz ~ 30MHz	±1.64 dB
Radiated Emissions	9kHz ~ 30MHz	±2.88 dB
	30MHz ~ 1GHz	±3.32 dB
	1GHz ~ 18GHz	±3.50 dB
	18GHz ~ 40GHz	±3.66 dB
Conducted Output Power	9kHz ~ 26GHz	±0.50 dB
Occupied Bandwidth	9kHz ~ 26GHz	±4.0 %
Conducted Spurious Emission	9kHz ~ 26GHz	±1.32 dB
Power Spectrum Density	9kHz ~ 26GHz	±0.62 dB

2. Summary of Test Results

FCC Rule	Description of Test Item	Result
FCC Part 15.203	Antenna Requirement	Passed
FCC Part 15.247(f)	RF Exposure(see the RF exposure report)	Passed
FCC Part 15.207, 15.407(b)(9)	Conducted Emissions	Passed
FCC Part 15.209, 15.407(b)(9), (10)	Radiated Emissions	Passed
FCC Part 15.407(b)(10)	Band-edge Emissions(Radiated)	Passed
FCC Part 15.407(a)(1), (3)	Maximum Peak Conducted Output Power	Passed
FCC Part 15.407, (e)	Occupied Bandwidth	Passed
FCC Part 15.407(a)(1), (3)	Maximum Power Spectral Density	Passed
FCC Part 15.407 (g)	Frequency Stability	Passed
FCC Part 15.407 (h)	Transmit Power Control (TPC)	N/A
FCC Part 15.407 (h)	Dynamic Frequency Selection (DFS)	N/A
Passed: The EUT complies with the essential requirements in the standard Failed: The EUT does not comply with the essential requirements in the standard N/A: Not applicable		

3. Antenna Requirement

3.1 Standard and Limit

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has an FPCB antenna, and the maximum antenna gain is 1.03dBi, fulfill the requirement of this section.

4. Conducted Emissions

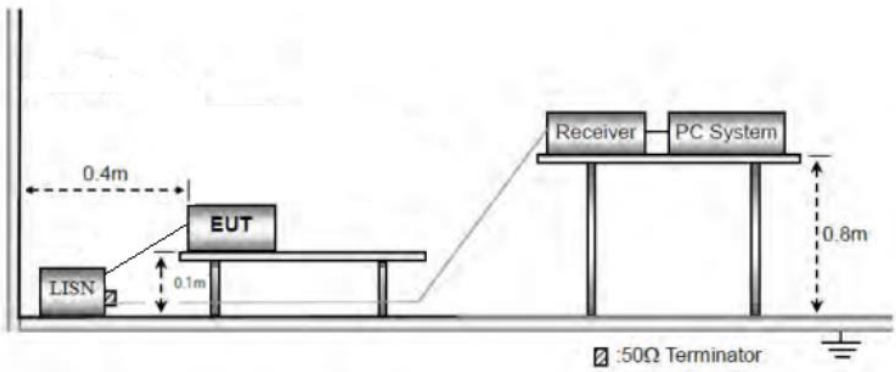
4.1 Standard and Limit

According to the rule FCC Part 15.207, Conducted emissions limit, the limit for a wireless device as below:

Frequency of Emission (MHz)	Conducted emissions (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50
Note 1: Decreases with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz Note 2: The lower limit applies at the band edges		

4.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.2.



Test Setup Block Diagram

a) The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

b) The following is the setting of the receiver
Attenuation: 10dB
Start Frequency: 0.15MHz
Stop Frequency: 30MHz
IF Bandwidth: 9kHz

c) The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

d) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
e) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

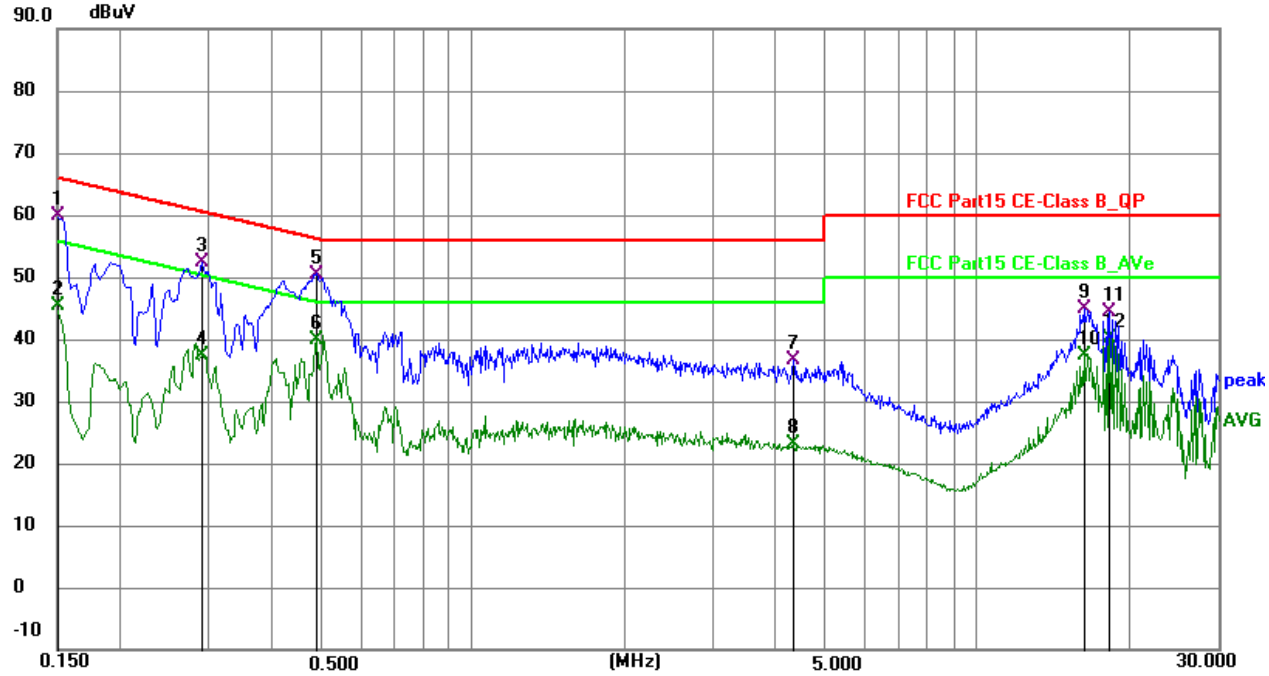
f) LISN is at least 80 cm from nearest part of EUT chassis.

g) For the actual test configuration, please refer to the related Item - photographs of the test setup.

4.3 Test Data and Results

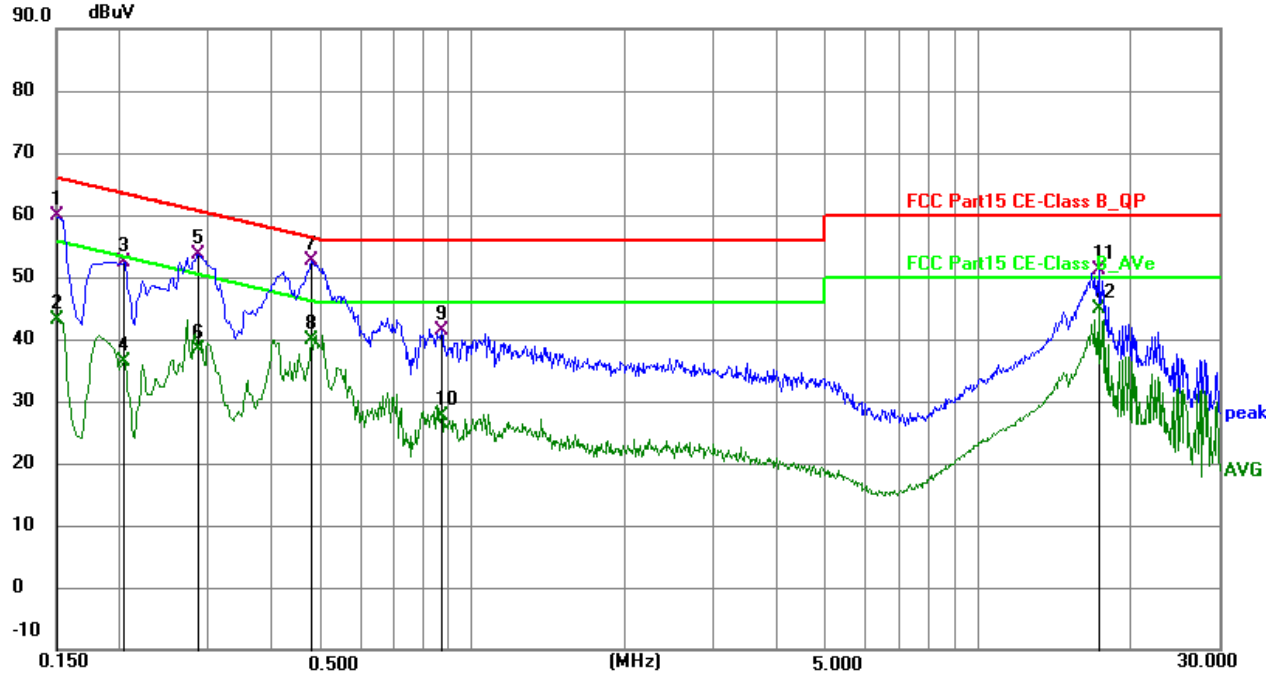
Both band1 to band4 all of the 802.11a, 802.11n and 802.11ac modes have been tested, the EUT complied with the FCC Part 15.207 standard limit for a wireless device, and with the worst case 802.11a_5180MHz as below:
Remark: Level = Reading + Factor, Margin = Level - Limit

Test Plots and Data of Conducted Emissions	
Tested Mode:	TM1
Test Voltage:	AC 120V/60Hz
Test Power Line:	Neutral
Remark:	



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	50.57	9.25	59.82	66.00	-6.18	QP	P	
2	0.1500	36.05	9.25	45.30	56.00	-10.70	AVG	P	
3	0.2895	42.96	9.38	52.34	60.54	-8.20	QP	P	
4	0.2895	28.08	9.38	37.46	50.54	-13.08	AVG	P	
5 *	0.4875	41.11	9.39	50.50	56.21	-5.71	QP	P	
6	0.4875	30.55	9.39	39.94	46.21	-6.27	AVG	P	
7	4.3350	27.14	9.54	36.68	56.00	-19.32	QP	P	
8	4.3350	13.66	9.54	23.20	46.00	-22.80	AVG	P	
9	16.2645	35.18	9.65	44.83	60.00	-15.17	QP	P	
10	16.2645	27.83	9.65	37.48	50.00	-12.52	AVG	P	
11	18.2985	34.47	9.83	44.30	60.00	-15.70	QP	P	
12	18.2985	30.24	9.83	40.07	50.00	-9.93	AVG	P	

Test Plots and Data of Conducted Emissions	
Tested Mode:	TM1
Test Voltage:	AC 120V/60Hz
Test Power Line:	Live
Remark:	



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	50.45	9.42	59.87	66.00	-6.13	QP	P	
2	0.1500	33.73	9.42	43.15	56.00	-12.85	AVG	P	
3	0.2040	42.86	9.40	52.26	63.45	-11.19	QP	P	
4	0.2040	26.97	9.40	36.37	53.45	-17.08	AVG	P	
5	0.2850	44.09	9.56	53.65	60.67	-7.02	QP	P	
6	0.2850	28.88	9.56	38.44	50.67	-12.23	AVG	P	
7 *	0.4785	42.96	9.58	52.54	56.37	-3.83	QP	P	
8	0.4785	30.18	9.58	39.76	46.37	-6.61	AVG	P	
9	0.8700	31.75	9.58	41.33	56.00	-14.67	QP	P	
10	0.8700	17.96	9.58	27.54	46.00	-18.46	AVG	P	
11	17.3174	41.17	9.88	51.05	60.00	-8.95	QP	P	
12	17.3174	35.01	9.88	44.89	50.00	-5.11	AVG	P	

5. Radiated Emissions(Below 1GHz)

5.1 Standard and Limit

According to FCC Part 15.407(b)(9), Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in FCC Part 15.209.

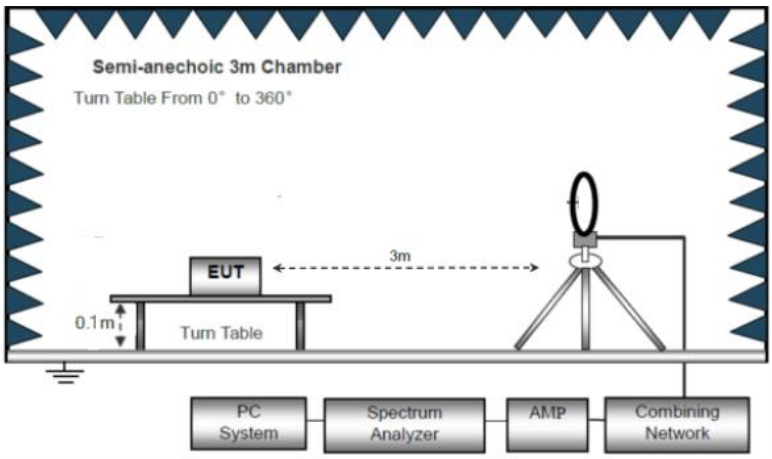
According to the rule FCC Part 15.209, Radiated emission limit for a wireless device as below:

Frequency of Emission (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3
Note: The more stringent limit applies at transition frequencies.		

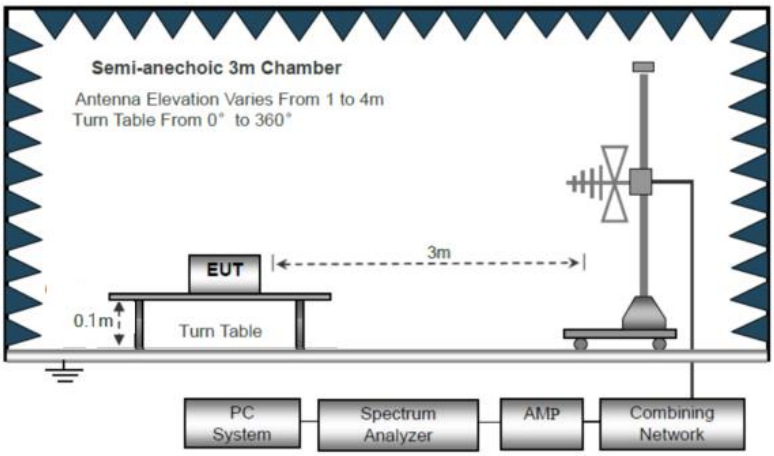
Note: Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

5.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.3 to 6.6.



Block Diagram of Radiated Emission Below 30MHz



Block Diagram of Radiated Emission From 30MHz to 1GHz

a) The EUT is placed on a turntable, which is 0.8m above ground plane for test frequency range blew 1GHz.

b) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.

c) Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 100 kHz

VBW ≥ RBW, Sweep = auto

Detector function = peak

Trace = max hold

d) Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

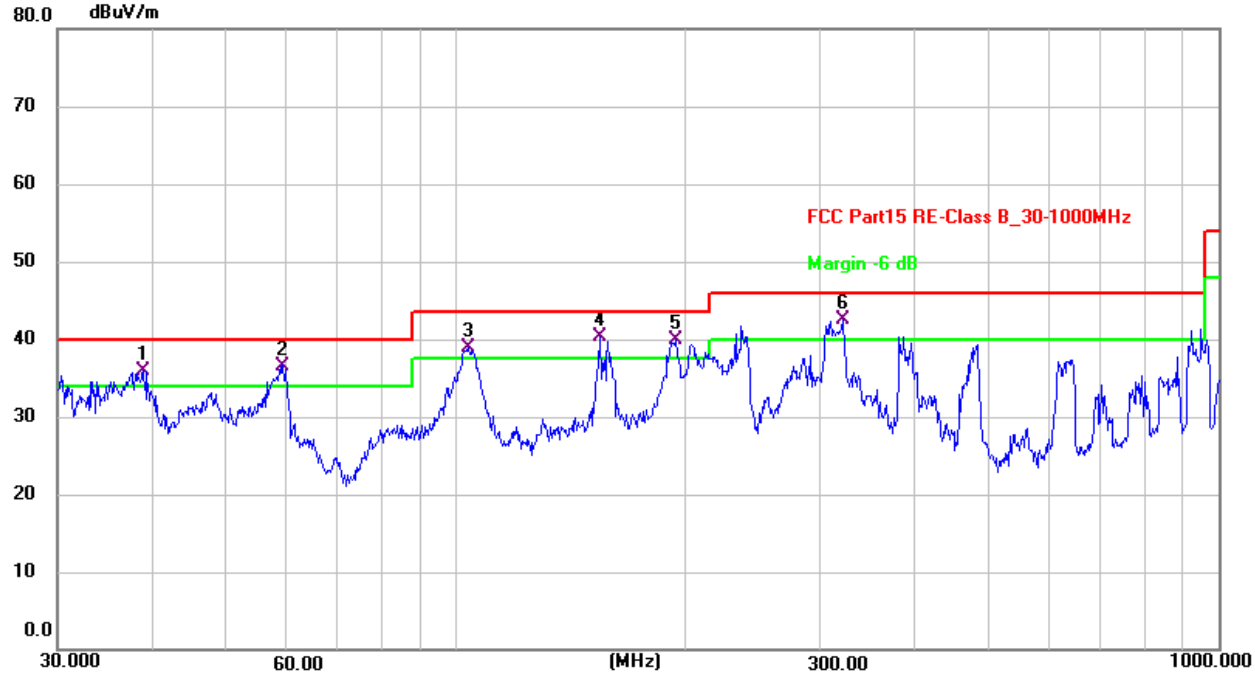
e) For the actual test configuration, please refer to the related item - EUT test photos.

5.3 Test Data and Results

Both band1 to band4 all of the 802.11a, 802.11n and 802.11ac modes have been tested, the EUT complied with the FCC Part 15.209 standard limit for a wireless device, and with the worst case 802.11a_5180 as below:

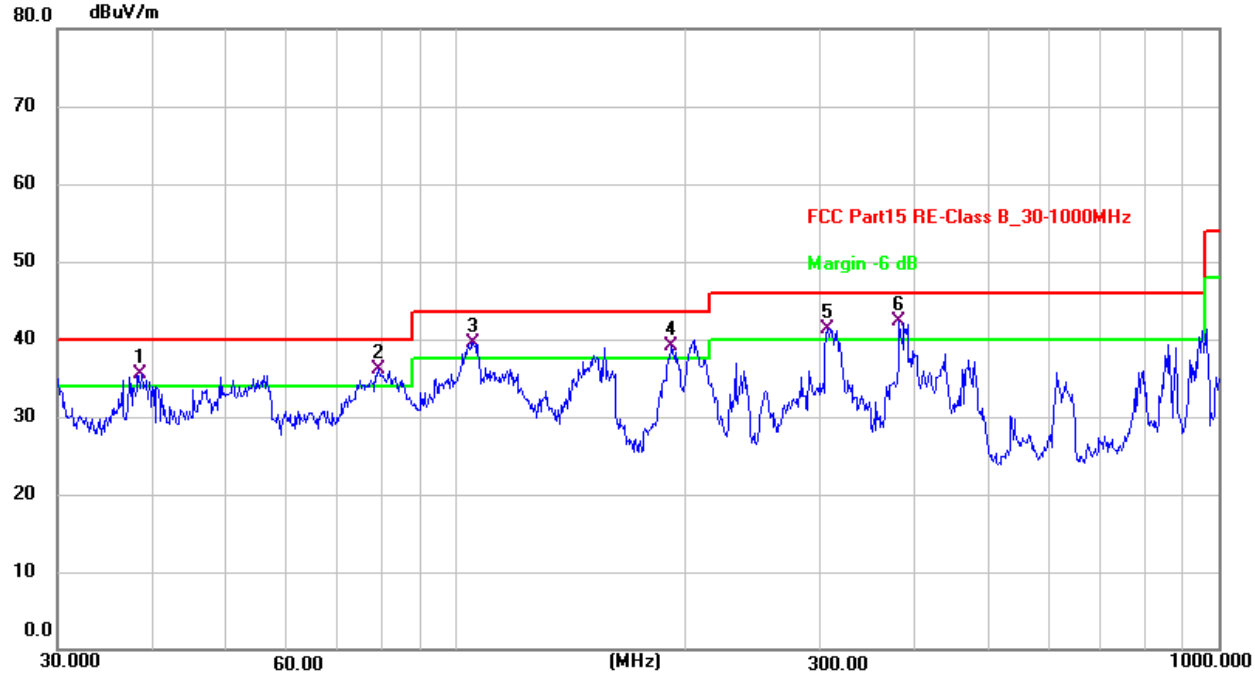
Remark: Level = Reading + Factor, Margin = Level - Limit

Radiated Emission Test Data (30MHz to 1GHz)	
Tested Mode:	TM1
Test Voltage:	AC 120V/60Hz
Test Antenna Polarization:	Horizontal
Remark:	



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 !	38.8877	44.36	-8.48	35.88	40.00	-4.12	QP	200	3	P	
2 !	59.2323	46.44	-9.84	36.60	40.00	-3.40	QP	100	11	P	
3 !	103.8054	50.53	-11.72	38.81	43.50	-4.69	QP	100	34	P	
4 *	154.2785	48.06	-7.79	40.27	43.50	-3.23	QP	200	211	P	
5 !	193.7726	51.51	-11.51	40.00	43.50	-3.50	QP	200	354	P	
6 !	321.0607	49.68	-7.22	42.46	46.00	-3.54	QP	200	1	P	

Radiated Emission Test Data (30MHz to 1GHz)	
Tested Mode:	TM1
Test Voltage:	AC 120V/60Hz
Test Antenna Polarization:	Vertical
Remark:	



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 !	38.6160	44.03	-8.52	35.51	40.00	-4.49	QP	100	12	P	
2 !	78.9651	48.90	-12.74	36.16	40.00	-3.84	QP	100	44	P	
3 !	105.2716	51.02	-11.52	39.50	43.50	-4.00	QP	100	331	P	
4 !	191.7450	50.50	-11.31	39.19	43.50	-4.31	QP	100	0	P	
5 !	306.7536	49.08	-7.79	41.29	46.00	-4.71	QP	100	211	P	
6 *	381.2485	48.59	-6.22	42.37	46.00	-3.63	QP	100	210	P	

Note 1: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Note 2: Testing is carried out with frequency rang 9kHz to 1GHz. The measurements greater than 20dB below the limit from 9kHz to 30MHz.

6. Spurious Emissions(Above 1GHz)

6.1 Standard and Limit

According to FCC Part 15.407(b), Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15–5.25 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25–5.35 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47–5.725 GHz band: All emissions outside of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

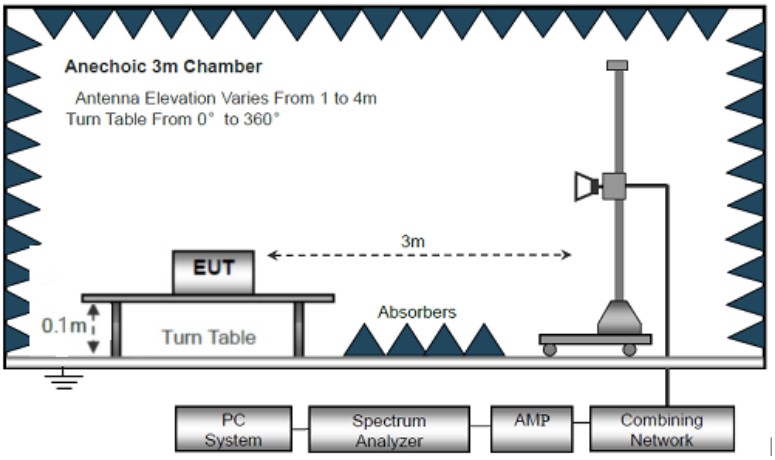
(4) For transmitters operating solely in the 5.725–5.850 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(5) The provisions of § 15.205 apply to intentional radiators operating under this section.

(6) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

6.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.3 to 6.6.



Block Diagram of Radiated Emission Above 1GHz

a) The EUT is placed on a turntable, which is 1.5m above ground plane for test frequency range above 1GHz.

b) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.

c) Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1GHz
VBW ≥ RBW, Sweep = auto
Detector function = peak
Trace = max hold

d) Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

e) For the actual test configuration, please refer to the related item - EUT test photos.

6.3 Test Data and Results

Both band1 to band4 all of the 802.11a, 802.11n and 802.11ac modes have been tested, the EUT complied with the FCC Part 15.407 standard limit, and with the worst case 802.11a, 802.11n_HT20 and 802.11ac_HT20 below:
Remark: Level = Reading + Factor, Margin = Level - Limit

UNII Band 1

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	Peak
802.11a_20MHz_Lowest Channel (5180MHz)							
10360	67.58	-6.22	61.36	68.2	-6.84	H	Peak
15540	52.41	-5.4	47.01	74	-26.99	H	Peak
10360	60.58	-6.22	54.36	68.2	-13.84	V	Peak
15540	54.42	-5.4	49.02	74	-24.98	V	Peak
802.11a_20MHz_Highest Channel (5240MHz)							
10480	60.86	-5.99	54.87	68.2	-13.33	H	Peak
15720	54.61	-5.53	49.08	74	-24.92	H	Peak
10480	63.27	-5.99	57.28	68.2	-10.92	V	Peak
15720	57.65	-5.53	52.12	74	-21.88	V	Peak
802.11n_20MHz_Lowest Channel (5180MHz)							
10360	66.14	-6.22	59.92	68.2	-8.28	H	Peak
15540	58	-5.4	52.6	74	-21.4	H	Peak
10360	65.24	-6.22	59.02	68.2	-9.18	V	Peak
15540	57.65	-5.4	52.25	74	-21.75	V	Peak
802.11n_20MHz_Highest Channel (5240MHz)							
10480	62	-5.99	56.01	68.2	-12.19	H	Peak
15720	55.14	-5.53	49.61	74	-24.39	H	Peak
10480	65.03	-5.99	59.04	68.2	-9.16	V	Peak
15720	58.54	-5.53	53.01	74	-20.99	V	Peak
802.11ac_20MHz_Lowest Channel (5180MHz)							
10360	63.92	-6.22	57.7	68.2	-10.5	H	Peak
15540	51.48	-5.4	46.08	74	-27.92	H	Peak
10360	62.65	-6.22	56.43	68.2	-11.77	V	Peak
15540	54.07	-5.4	48.67	74	-25.33	V	Peak
802.11ac_20MHz_Highest Channel (5240MHz)							
10480	66.37	-5.99	60.38	68.2	-7.82	H	Peak
15720	53.3	-5.53	47.77	74	-26.23	H	Peak
10480	59.39	-5.99	53.4	68.2	-14.8	V	Peak
15720	55.84	-5.53	50.31	74	-23.69	V	Peak

UNII Band 4

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	Peak
802.11a_20MHz_Lowest Channel (5745MHz)							
11490	56.66	-4.34	52.32	74	-21.68	H	Peak
17235	58.56	-3.29	55.27	68.2	-12.93	H	Peak
11490	57.43	-4.34	53.09	74	-20.91	V	Peak
17235	53.01	-3.29	49.72	68.2	-18.48	V	Peak
802.11a_20MHz_Highest Channel (5825MHz)							
11650	56.15	-4.16	51.99	74	-22.01	H	Peak
17475	60.59	-2.53	58.06	68.2	-10.14	H	Peak
11650	57.29	-4.16	53.13	74	-20.87	V	Peak
17475	52.88	-2.53	50.35	68.2	-17.85	V	Peak
802.11n_20MHz_Lowest Channel (5745MHz)							
11490	57.29	-4.34	52.95	74	-21.05	H	Peak
17235	55.03	-3.29	51.74	68.2	-16.46	H	Peak
11490	57.27	-4.34	52.93	74	-21.07	V	Peak
17235	57.46	-3.29	54.17	68.2	-14.03	V	Peak
802.11n_20MHz_Highest Channel (5825MHz)							
11650	56.19	-4.16	52.03	74	-21.97	H	Peak
17475	56.25	-2.53	53.72	68.2	-14.48	H	Peak
11650	57.21	-4.16	53.05	74	-20.95	V	Peak
17475	52.15	-2.53	49.62	68.2	-18.58	V	Peak
802.11ac_20MHz_Lowest Channel (5745MHz)							
11490	56.34	-4.34	52	74	-22	H	Peak
17235	60.3	-3.29	57.01	68.2	-11.19	H	Peak
11490	57.59	-4.34	53.25	74	-20.75	V	Peak
17235	57.66	-3.29	54.37	68.2	-13.83	V	Peak
802.11ac_20MHz_Highest Channel (5825MHz)							
11650	58.12	-4.16	53.96	74	-20.04	H	Peak
17475	56.29	-2.53	53.76	68.2	-14.44	H	Peak
11650	57.22	-4.16	53.06	74	-20.94	V	Peak
17475	56.54	-2.53	54.01	68.2	-14.19	V	Peak

Note 1: this EUT was tested in 3 orthogonal positions, with the X-axis being the worst, and the worst case position data was reported.

Note 2: Testing is carried out with frequency rang 1GHz to the tenth harmonics, If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit, so there is no record.

Note 3: Above 18GHz not recorded for no spurious point have a margin of less than 6 dB with respect to the limits.

7. Band-edge Emissions(Radiated)

7.1 Standard and Limit

According to §15.407(b), Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15–5.25 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

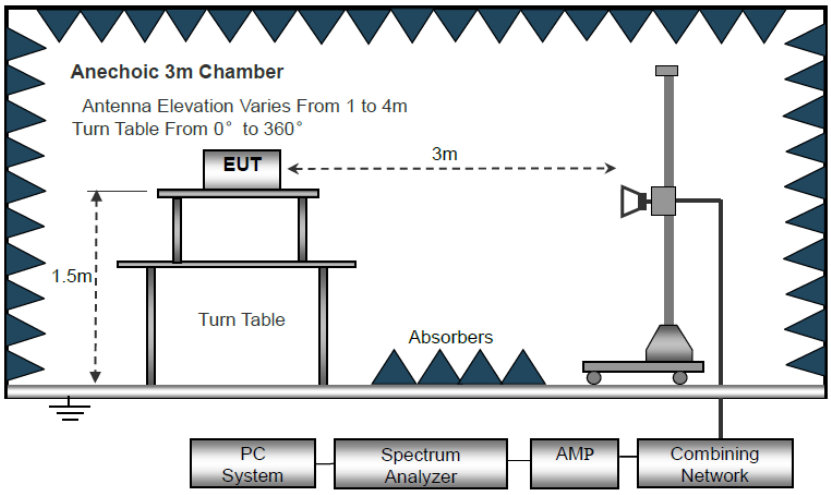
(2) For transmitters operating in the 5.25–5.35 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47–5.725 GHz band: All emissions outside of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating solely in the 5.725–5.850 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

7.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.3 to 6.6 and section 6.10.



Test Setup Block Diagram

7.3 Test Data and Results

Based on all tested data, the EUT complied with the FCC Part 15.407 standard limit, and with the worst case as below:

Remark: Level = Reading + Factor, Margin = Level - Limit

UNII Band 1_ 802.11a_20MHz_Lowest Channel (5180MHz)

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	Peak
5150	62.57	-13.96	48.61	74	-25.39	H	Peak
5150	64.07	-13.96	50.11	74	-23.89	V	Peak

UNII Band 1_ 802.11a_20MHz_Highest Channel (5240MHz)

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	Peak
5350	56.37	-13.26	43.11	74	-30.89	H	Peak
5460	50.07	-12.88	37.19	74	-36.81	H	Peak
5350	58.59	-13.26	45.33	74	-28.67	V	Peak
5460	53.37	-12.88	40.49	74	-33.51	V	Peak

UNII Band 1_802.11n_40MHz_Lowest Channel (5190MHz)

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	Peak
5150	65.5	-13.96	51.54	74	-22.46	H	Peak
5150	62.55	-13.96	48.59	74	-25.41	V	Peak

UNII Band 1_ 802.11n_40MHz_Highest Channel (5230MHz)

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	Peak
5350	59.22	-13.26	45.96	74	-28.04	H	Peak
5460	54.25	-12.88	41.37	74	-32.63	H	Peak
5350	55.25	-13.26	41.99	74	-32.01	V	Peak
5460	55.77	-12.88	42.89	74	-31.11	V	Peak

UNII Band 4_ 802.11a_20MHz_Lowest Channel (5745MHz)

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	Peak
5650	50.37	-12.3	38.07	68.2	-30.13	H	Peak
5700	55.72	-12.16	43.56	105.6	-62.04	H	Peak
5720	74.99	-12.09	62.9	110.8	-47.9	H	Peak
5650	53.24	-12.3	40.94	68.2	-27.26	V	Peak
5700	50.13	-12.16	37.97	105.6	-67.63	V	Peak
5720	75.67	-12.09	63.58	110.8	-47.22	V	Peak

UNII Band 4_ 802.11a_20MHz_Highest Channel (5825MHz)

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	Peak
5850	72.04	-11.72	60.32	122.2	-61.88	H	Peak
5875	55.67	-11.64	44.03	110.8	-66.77	H	Peak
5925	51.46	-11.5	39.96	68.2	-28.24	H	Peak
5850	66.8	-11.72	55.08	122.2	-67.12	V	Peak
5875	56.97	-11.64	45.33	110.8	-65.47	V	Peak
5925	54.18	-11.5	42.68	68.2	-25.52	V	Peak

UNII Band 4_802.11n_40MHz_Lowest Channel (5755MHz)

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	Peak
5650	51.49	-12.3	39.19	68.2	-29.01	H	Peak
5700	53.18	-12.16	41.02	105.6	-64.58	H	Peak
5720	72.25	-12.09	60.16	110.8	-50.64	H	Peak
5650	55.95	-12.3	43.65	68.2	-24.55	V	Peak
5700	53.3	-12.16	41.14	105.6	-64.46	V	Peak
5720	74.71	-12.09	62.62	110.8	-48.18	V	Peak

UNII Band 4_ 802.11a_40MHz_Highest Channel (5795MHz)

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	Peak
5850	69.67	-11.72	57.95	122.2	-64.25	H	Peak
5875	66.28	-11.64	54.64	110.8	-56.16	H	Peak
5925	53.63	-11.5	42.13	68.2	-26.07	H	Peak
5850	67.75	-11.72	56.03	122.2	-66.17	V	Peak
5875	66.16	-11.64	54.52	110.8	-56.28	V	Peak
5925	55.77	-11.5	44.27	68.2	-23.93	V	Peak

Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit, so there is no record.

8. Maximum Conducted Output Power

8.1 Standard and Limit

According to 15.407(a): (1) For the band 5.15–5.25 GHz.
For an outdoor or indoor access point operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band..

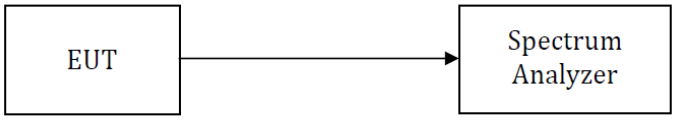
For client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

(2) For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725–5.895 GHz: the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500–kHz band.

8.2 Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.
1) A measurement instrument with an integrated channel bandwidth function may be used to automate the test process.
2) Set center of frequency = operating frequency.
3) Connect the EUT to the RF input of the spectrum analyzer via a low loss RF cable
4) Set the RBW = 1MHz, VBW = 3MHz, Detector = RMS, Sweep = Auto.
5) Set the SPAN to 40MHz/80MHz/160MHz for 20MHz/40MHz/80MHz emission bandwidth mode.
6) Measure the highest amplitude appearing on spectral display and mark the value.
7) Repeat the above procedures until all frequency measured was complete.



Test Setup Block Diagram

8.3 Test Data and Results

Please refer to the appendix for details.

9. Occupied Bandwidth

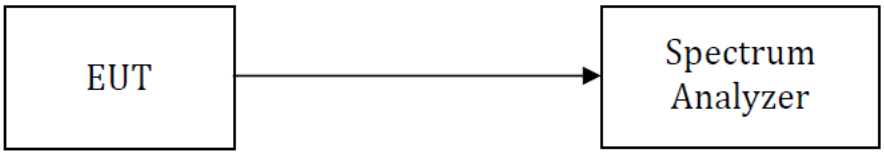
9.1 Standard and Limit

According to 15.407(a), Within the 5.250–5.350 GHz and 5.470–5.725 GHz bands the 26 dB bandwidth shall be tested.

According to 15.407(e), Within the 5.725–5.850 GHz and 5.850–5.895 GHz bands, the minimum 6 dB bandwidth of U–NII devices shall be at least 500 kHz.

9.2 Test Procedure

According to the ANSI 63.10-2013, section 6.9, the emission bandwidth test method as follows.
1) Remove the antenna from the EUT and connect to the spectrum analyzer via a low loss RF cable.
2) Set the spectrum analyzer to any one measured frequency within its operating range.
3) 6dB: Set RBW = 100kHz, VBW ≥ [3 × RBW], Sweep = Auto.
   26dB: Set RBW to 1%~5% of bandwidth, VBW = RBW, Sweep = Auto.
4) Set a reference level on the measuring instrument equal to the highest peak value.
5) Measure the frequency difference of two frequencies that were attenuated 6dB or 26dB from the reference level. Record the frequency difference as the emission bandwidth.
6) Repeat the above procedures until all frequencies measured were complete.



Test Setup Block Diagram

9.3 Test Data and Results

Please refer to the appendix for details.

10. Maximum Power Spectral Density

10.1 Standard and Limit

According to 15.407(a):
(1) For the band 5.15–5.25 GHz.
For an outdoor or indoor access point operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band..

For client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

(2) For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725–5.895 GHz: the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500–kHz band.

10.2 Test Procedure

1) Remove the antenna from the EUT and connect to the spectrum analyzer via a low loss RF cable.
2) Set the spectrum analyzer to any one measured frequency within its operating range.
3) Set RBW = 1MHz, VBW = 3MHz, Sweep = Auto, Detector = RMS.
4) Measure the highest amplitude appearing on spectral display and mark the value.
5) Repeat above procedures until all frequencies measured were complete.

Test Setup Block Diagram

10.3 Test Data and Results

Please refer to the appendix for details.

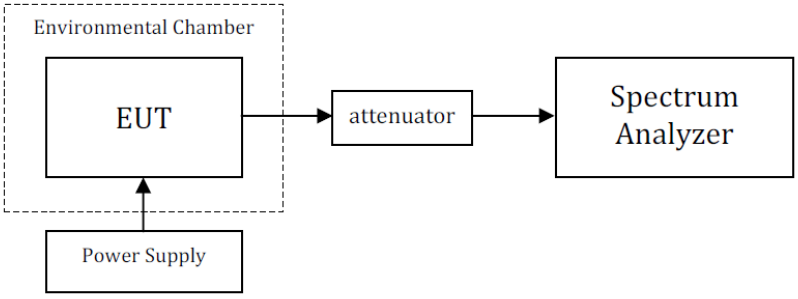
11. Frequency Stability

11.1 Standard and Limit

According to 15.407(g), Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

11.2 Test Procedure

Test is conducting under the description of ANSI C63.10-2013 section 6.8.



Test Setup Block Diagram

11.3 Test Data and Results

Mode	Frequency (MHz)	Temperature (°C)	Voltage (VAC)	Measured Frequency (MHz)	Limit (MHz)	Verdict
Carrier Wave	5180	20	110	5179.964	5150 to 5250	Pass
			122	5179.965	5150 to 5250	Pass
			134	5179.972	5150 to 5250	Pass
		-30	122	5179.963	5150 to 5250	Pass
		-20	122	5179.963	5150 to 5250	Pass
		-10	122	5179.964	5150 to 5250	Pass
		0	122	5179.965	5150 to 5250	Pass
		10	122	5179.965	5150 to 5250	Pass
		30	122	5179.965	5150 to 5250	Pass
		40	122	5179.964	5150 to 5250	Pass
		50	122	5179.934	5150 to 5250	Pass
	5200	20	110	5199.921	5150 to 5250	Pass
			122	5199.923	5150 to 5250	Pass
			134	5199.923	5150 to 5250	Pass
		-30	122	5199.922	5150 to 5250	Pass
		-20	122	5199.924	5150 to 5250	Pass
		-10	122	5199.926	5150 to 5250	Pass

		0	122	5199.918	5150 to 5250	Pass
		10	122	5199.915	5150 to 5250	Pass
		30	122	5199.924	5150 to 5250	Pass
		40	122	5199.927	5150 to 5250	Pass
		50	122	5199.923	5150 to 5250	Pass
	5240	20	110	5239.947	5150 to 5250	Pass
			122	5239.947	5150 to 5250	Pass
			134	5239.948	5150 to 5250	Pass
		-30	122	5239.946	5150 to 5250	Pass
		-20	122	5239.942	5150 to 5250	Pass
		-10	122	5239.943	5150 to 5250	Pass
		0	122	5239.951	5150 to 5250	Pass
		10	122	5239.949	5150 to 5250	Pass
		30	122	5239.944	5150 to 5250	Pass
		40	122	5239.949	5150 to 5250	Pass
		50	122	5239.947	5150 to 5250	Pass
	5745	20	110	5744.921	5725 to 5850	Pass
			122	5744.928	5725 to 5850	Pass
			134	5744.921	5725 to 5850	Pass
		-30	122	5744.925	5725 to 5850	Pass
		-20	122	5744.916	5725 to 5850	Pass
		-10	122	5744.921	5725 to 5850	Pass
		0	122	5744.925	5725 to 5850	Pass
		10	122	5744.911	5725 to 5850	Pass
		30	122	5744.924	5725 to 5850	Pass
		40	122	5744.915	5725 to 5850	Pass
		50	122	5744.923	5725 to 5850	Pass
	5785	20	110	5784.934	5725 to 5850	Pass
			122	5784.945	5725 to 5850	Pass
			134	5784.951	5725 to 5850	Pass
		-30	122	5784.942	5725 to 5850	Pass
		-20	122	5784.941	5725 to 5850	Pass
		-10	122	5784.953	5725 to 5850	Pass
		0	122	5784.948	5725 to 5850	Pass
		10	122	5784.941	5725 to 5850	Pass
		30	122	5784.941	5725 to 5850	Pass
		40	122	5784.952	5725 to 5850	Pass
		50	122	5784.952	5725 to 5850	Pass
	5825	20	110	5824.916	5725 to 5850	Pass
			122	5824.919	5725 to 5850	Pass
			134	5824.917	5725 to 5850	Pass
		-30	122	5824.921	5725 to 5850	Pass
		-20	122	5824.922	5725 to 5850	Pass

		-10	122	5824.922	5725 to 5850	Pass
		0	122	5824.921	5725 to 5850	Pass
		10	122	5824.921	5725 to 5850	Pass
		30	122	5824.921	5725 to 5850	Pass
		40	122	5824.921	5725 to 5850	Pass
		50	122	5824.921	5725 to 5850	Pass

******* END OF REPORT *******